



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|-----------------------|------------------|
| 09/909,661 | 07/19/2001 | Alexander Jacobson | 005388.P006 | 1818 |
| 7590 06/14/2005 | | | EXAMINER | |
| Daniel E. Ovanezian BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP Seventh Floor 12400 Wilshire Boulevard Los Angeles, CA 90025-1026 | | | BOUTSIKARIS, LEONIDAS | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2872 | |
| DATE MAILED: 06/14/2005 | | | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-----------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 09/909,661 | JACOBSON, ALEXANDER | |
| | Examiner | Art Unit | |
| | Leo Boutsikaris | 2872 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2005.
 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22,26,27,30 and 31 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) ☒ Claim(s) 22,26,27,30 and 31 is/are allowed.
 6) ☒ Claim(s) 1-3,10 and 13-16 is/are rejected.
 7) ☒ Claim(s) 4-9,11,12 and 17-21 is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☒ The drawing(s) filed on 06 January 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claims 11-12 are objected to because of the following informalities:

Claim 11 recites that the beamsplitter combines into the first output port, S-polarized light from the first input port with P-polarized light from the third input port and into the second output port, S-polarized light from the second input port with P-polarized light from the fourth input port. However, based on claim language in the same claim, see line 13 (“receive S-polarized light from the first and third input ports and P-polarized light from the second and fourth input ports”) and the geometry depicted in Fig. 3, the above phrase should recite that the beamsplitter combines into the first output port, S-polarized light from the first input port with P-polarized light from the second input port, and into the second output port, S-polarized light from the third input port with P-polarized light from the fourth input port instead.

Claim 12 inherits the deficiency of claim 11 from which it depends.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2872

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Yokoyama (US 5,621,832).

Yokoyama discloses an optical coupler (Fig. 1) comprising:

a housing 35 having a plurality of four ports, each of the four ports coupled to a corresponding one of a plurality of four fibers 31a-31d;

a plurality of collimating lenses, 32a-32d, disposed within the housing, each of the lenses receiving a light beam from a corresponding port;

a beamsplitter 34 coupled to the four collimating lenses to receive the light beam from each of the plurality of the collimating lenses, the beamsplitter having a common optical aperture disposed on an outer surface area to simultaneously receive the light received from each of the four lenses (lines 16-46, col. 4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-3, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yokoyama (US 5,621,832) in view of Optics Guide 5 (Melles Griot).

Yokoyama discloses all the limitations of the above claims except for teaching the use of a rhombic prism non-polarizing beamsplitter in place of the beamsplitter plate 34. The Optics Guide by Melles Griot shows typical non-polarizing beamsplitter cubes used in optics (p. 13-9 to

Art Unit: 2872

13-12). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a beam splitter cube instead of a beamsplitter plate in Yokoyama's device, since the latter comprises a plurality of dielectric layers deposited on a substrate, thus requiring a more complex manufacturing process.

Regarding claim 10, the beamsplitter of Melles Griot is made from high index glass (p. 13-12).

Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yokoyama (US 5,621,832).

Yokoyama discloses all the limitations of the above claims except for specifying that the collimating lenses are GRIN lenses, or the size and the material of the housing. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use GRIN lenses in Yokoyama's coupler, and make the housing from aluminum thermally matched to the beamsplitter, since Official Notice is taken that GRIN lenses are widely used to couple light from and into optical fibers, and that aluminum is used for housing optical components. GRIN lenses are advantageous because of their optimal light coupling efficiency. Finally it is noted that the geometry of Yokoyama's device is inherently small in size compared to other optical couplers (lines 60-67, col. 1).

Response to Arguments

Applicant's arguments with respect to claims 1-22, 26-27, 30-31 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

Claim 11 would be allowable if rewritten or amended to overcome the objections, set forth in this Office action.

Claim 12 would be allowable if rewritten to overcome the objections, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claims 4-9, 17-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 22, 26-27, 30-31 are allowed.

Claims 4-9, 11-12, 17-22, 26-27, 30-31 are allowable over the prior art of record for at least the reason that even though the prior art discloses optical couplers comprising a non-polarizing beamsplitter having a common optical aperture receiving light from all the input/output ports, or optical couplers comprising a plurality of polarizing beamsplitters, the polarizing beamsplitters having a plurality of optical apertures receiving light from the various ports, the prior art fails to teach or reasonably suggest, regarding claims 4-9, 17, an apparatus comprising a beamsplitter having a common optical aperture disposed on an outer surface area to simultaneously receive light from each of the plurality of collimating lenses, wherein the beamsplitter comprises a single reflective polarizer plate, regarding claims 11-12, an apparatus comprising a beamsplitter having a common optical aperture disposed on an outer surface area to simultaneously receive light from each of the plurality of collimating lenses, wherein the beamsplitter combines into the first output port, S-polarized light from the first input port with P-polarized light from the second input port, and combines into the second output port, S-polarized

Art Unit: 2872

light from the third input port with P-polarized light from the fourth input port, regarding claims 18-20, an apparatus comprising a beamsplitter having a common optical aperture disposed on an outer surface area to simultaneously receive light from each of the plurality of collimating lenses, wherein the first, second, third and fourth input ports are arranged in one dimensional linear array, or two-dimensional array, regarding claim 21, an apparatus comprising a beamsplitter having a common optical aperture disposed on an outer surface area to simultaneously receive light from each of the plurality of collimating lenses, wherein the beamsplitter prism is constructed from a material comprising birefringent crystal material, regarding claim 22, an apparatus comprising a rhombic prism having a common optical aperture disposed on an outer surface area to simultaneously receive light from each of the plurality of collimating lenses, and separate the S-polarized and P-polarized components of the light beam into spatially separate beams, regarding claims 26-27, a method comprising collimating at least four light beams by a single device having a common optical aperture, reflecting a S-polarized component of each of the at least four light beams and refracting a P-polarized component of each of the at least four light beams using the single device, and regarding claims 30-31, an apparatus comprising means for receiving at least four light beams by a single device having a common optical aperture, means for reflecting a S-polarized component of each of the at least four light beams and refracting a P-polarized component of each of the at least four light beams using the single device, as set forth by the claimed combination.

Yokoyama's device utilizes a single beamsplitter to receive light from all the ports. However, the beamsplitter is strictly polarization independent (lines 3-6, col. 2). Furthermore,

Art Unit: 2872

the various ports are positioned in a specific configuration on each face of the housing (see Fig. 3). Popelek (US 6,363,186, Fig. 1) and Lee (US 6,031,952, Fig. 3A) disclose optical couplers utilizing a plurality of non-polarizing beamsplitters. Hegg (US 5,245,472, Fig. 3) discloses an optical coupler utilizing a plurality of polarizing beamsplitters coupled to the various ports. Yuan (US 6,160,665, Figs. 4C-4D) discloses a PBS with high extinction ratio, wherein a beam polarizing beam splitter surface 401 receives light from two (input) ports only, e.g., 414 and 415. None of the above references discloses an optical coupler comprising a single polarizing beamsplitter receiving light from all the ports.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Leo Boutsikaris whose telephone number is 571-272-2308.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Leo Boutsikaris, Ph.D., J.D.
Primary Patent Examiner, AU 2872
June 9, 2005



LEONIDAS BOUTSIKARIS
PRIMARY EXAMINER